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**APPLICATION
FOR
UNITED STATES
LETTERS PATENT**

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FOR: RADIO COMMUNICATION TERMINAL SYSTEM
AUTOMATIC FUNCTION SETTING METHOD
USED IN THE SAME

DOCKET NO.: 11P338920

RADIO COMMUNICATION TERMINAL SYSTEM AUTOMATIC FUNCTION
SETTING METHOD USED IN THE SAME

BACKGROUND OF THE INVENTION

This application claims benefit of Japanese Patent
5 Application No. 11-338920 filed on November 30, 1999,
the contents of which are incorporated by the reference.

The present invention relates to radio
communication terminal systems and automatic function
setting methods used in the same and, more particularly,
10 to position recognition and function setting in W-CDMA
(Wideband Code Division Multiple access) and like radio
communication terminal systems.

Recently, radio communication terminal systems
such as PHS (Personal Handyphone System) are in a trend
15 of smaller size and lighter weight, and their portability
is becoming readier. Usually, the presence position of
a PHS user can be confirmed by making a telephone call
and talking with the user.

By this method, however, it is difficult for a PHS
20 user who is unfamiliar with geographical features to
confirm his or her own presence position. To solve this
problem, Japanese Patent Laid-Open No. 11-262047
proposes a technique, in which sets of base station
identification data and corresponding presence position
25 data are stored in a recording medium.

In the proposed technique, a group of base station
identification data obtained by progressively receiving
control channels of public base station capable of being

utilized by the own or any other terminal system, is compared to a group of base station identification data stored in recording medium. By so doing, presence position data as data combination with a maximum number of identical data piece pairs can be obtained for readily confirming the presence position of the own or any other terminal system.

As for radio communication terminal system presence position determination, Japanese Patent Laid-Open No. 7-181242 shows a technique of easily determining the presence position of a mobile station in a CDMA (code division multiple access) digital mobile communication system.

However, the above prior art radio communication terminal system is receiving waveform from only a single base station during its waiting time, and therefore can specify its presence position only as wide area. In addition, the terminal system user should manually set, when necessary, functions of setting call arrival tone, arrival tone level, etc.

SUMMARY OF THE INVENTION

An object of the present invention is to solve the above problems by the provision of a radio communication terminal system and an automatic function setting method used in the same, in which the terminal system itself can make recognition as to whether its presence position is a registered one.

Another object of the present invention is to

provide a radio communication terminal system and an automatic function setting method used in the same, in which the terminal system can set by itself various functions corresponding to registered presence

5 positions.

According to the present invention, there are provided the following radio communication terminal systems:

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10 A radio communication terminal system which executes a waiting operation by receiving broadcast data from a plurality of base stations, comprising a storing means for storing broadcast data received from a plurality of base stations when the system is in a preset presence position and reception levels of these
15 broadcast data as registered data, and comparing means for comparing, in the waiting operation, the broadcast data received from the plurality of base stations and the reception levels of these data with registered data in the storing means.

20 A radio communication terminal system which executes a waiting operation by receiving broadcast data from a plurality of base stations, comprising a storing means for storing broadcast data received from a plurality of base stations when the system is in a preset
25 presence position and reception levels of these broadcast data as registered data, comparing means for comparing, in the waiting operation, the broadcast data received from the plurality of base stations and the

reception levels of these data with registered data in
the storing means and setting means for setting, when
the comparing means detects coincidence of compared data,
its functions of contents of preset function setting
5 items corresponding to the pertinent registered data.

A radio communication terminal system which
executes a waiting operation by receiving broadcast data
from a plurality of base stations, comprising a storing
means for storing broadcast data received from a
10 plurality of base stations when the system is in a preset
presence position and reception levels of these
broadcast data as registered data, comparing means for
comparing, in the waiting operation, the broadcast data
received from the plurality of base stations and the
15 reception levels of these data with registered data in
the storing means and setting means for setting, when
the comparing means detects coincidence of compared data,
its functions of contents of preset function setting
items corresponding to the pertinent registered data,
20 the preset function setting items at least including call
arrival tone, call arrival tone level, out-of-home
dealing function ON/OFF and call transfer function
ON/OFF.

A radio communication terminal system which
25 executes a waiting operation by receiving broadcast data
from a plurality of base stations, comprising a storing
means for storing broadcast data received from a
plurality of base stations when the system is in a preset

presence position and reception levels of these
broadcast data as registered data, comparing means for
comparing, in the waiting operation, the broadcast data
received from the plurality of base stations and the
5 reception levels of these data with registered data in
the storing means and setting means for setting, when
the comparing means detects coincidence of compared data,
its functions of contents of preset function setting
items corresponding to the pertinent registered data and
10 restoring a preset default setting when the broadcast
data received from the plurality of base stations and
the reception levels of these data are changed from the
compared registered data.

A radio communication terminal system which
15 executes a waiting operation by receiving broadcast data
from a plurality of base stations, comprising a storing
means for storing broadcast data received from a
plurality of base stations when the system is in a preset
presence position and reception levels of these
20 broadcast data as registered data, comparing means for
comparing, in the waiting operation, the broadcast data
received from the plurality of base stations and the
reception levels of these data with registered data in
the storing means and setting means for setting, when
25 the comparing means detects coincidence of compared data,
its functions of contents of preset function setting
items corresponding to the pertinent registered data,
the preset function setting items at least including call

arrival tone, call arrival tone level, out-of-home
dealing function ON/OFF and call transfer function
ON/OFF and restoring a preset default setting when the
broadcast data received from the plurality of base
5 stations and the reception levels of these data are
changed from the compared registered data.

The setting means sets a high speed travel mode
representing arrived call reception prohibition when the
broadcast data from the plurality of base stations and
10 the reception levels of these data undergo frequent
changes.

According to another aspect of the present
invention, there are provided the following automatic
function setting method for a radio communication
15 terminal system:

An automatic function setting method for a radio
communication terminal system, which executes a waiting
operation by receiving broadcast data from a plurality
of base stations, comprising a step of storing, when the
20 system is in a preset registered presence position,
broadcast data received from the plurality of base
stations and reception levels of these data as registered
data, and a step of comparing the broadcast data received
from the plurality of base stations and the reception
25 levels of these data with the registered data in the
waiting operation.

An automatic function setting method for a radio
communication terminal system, which executes a waiting

operation by receiving broadcast data from a plurality
of base stations, comprising a step of storing, when the
system is in a preset registered presence position,
broadcast data received from the plurality of base
5 stations and reception levels of these data as registered
data, a step of comparing the broadcast data received
from the plurality of base stations and the reception
levels of these data with the registered data in the
waiting operation and a step of setting own functions
10 of contents of preset function setting items
corresponding to the pertinent registered data when
coincidence of compared data is detected in the step of
comparing data with the registered data.

An automatic function setting method for a radio
15 communication terminal system, which executes a waiting
operation by receiving broadcast data from a plurality
of base stations, comprising a step of storing, when the
system is in a preset registered presence position,
broadcast data received from the plurality of base
20 stations and reception levels of these data as registered
data, a step of comparing the broadcast data received
from the plurality of base stations and the reception
levels of these data with the registered data in the
waiting operation and a step of setting own functions
25 of contents of preset function setting items
corresponding to the pertinent registered data when
coincidence of compared data is detected in the step of
comparing data with the registered data, the preset

function setting items at least including call arrival tone, call arrival tone level, out-of-home dealing function ON/OFF and call transfer function ON/OFF.

An automatic function setting method for a radio communication terminal system, which executes a waiting operation by receiving broadcast data from a plurality of base stations, comprising a step of storing, when the system is in a preset registered presence position, broadcast data received from the plurality of base stations and reception levels of these data as registered data, a step of comparing the broadcast data received from the plurality of base stations and the reception levels of these data with the registered data in the waiting operation and a step of setting own functions of contents of preset function setting items corresponding to the pertinent registered data when coincidence of compared data is detected in the step of comparing data with the registered data, wherein in the step of setting own functions, a preset default setting is restored when the broadcast data received from the plurality of base stations and the reception levels of these data are changed from the compared registered data.

An automatic function setting method for a radio communication terminal system, which executes a waiting operation by receiving broadcast data from a plurality of base stations, comprising a step of storing, when the system is in a preset registered presence position, broadcast data received from the plurality of base

stations and reception levels of these data as registered data, a step of comparing the broadcast data received from the plurality of base stations and the reception levels of these data with the registered data in the waiting operation and a step of setting own functions of contents of preset function setting items corresponding to the pertinent registered data when coincidence of compared data is detected in the step of comparing data with the registered data, the preset function setting items at least including call arrival tone, call arrival tone level, out-of-home dealing function ON/OFF and call transfer function ON/OFF, wherein in the step of setting own functions, a preset default setting is restored when the broadcast data received from the plurality of base stations and the reception levels of these data are changed from the compared registered data.

In the step of setting own functions, a high speed travel mode representing arrived call reception prohibition made is set when the broadcast data from the plurality of base stations and the reception levels of these data undergo frequent changes.

The W-CDMA terminal system of the present invention is executing, in its waiting time, a waiting operation by receiving broadcast data from a certain number of base stations, and stores its presence position in itself by comparing the broadcast data of the certain number of base stations and broadcast data reception levels with

stored contents for recognizing the terminal's presence position and setting the arrival tone and arrival tone level for each stored position.

Thus, when the W-CDMA terminal system is brought
5 from one plane to another, it can automatically change the functions having been set to others, and the user thus need not manually set. For example, when the user is in office, the terminal system sets the arrival tone to "OFF" or "VIBRATION", thus preventing, when the user
10 returns home, failure of being informed of a call arrival by leaving the call arrival tone "OFF".

Other objects and features will be clarified from the following description with reference to attached drawings.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a W-CDMA terminal system as one embodiment of the present invention;

Fig. 2 is a flow chart for describing the operation
of an embodiment of the present invention in presence
20 position store setting and function setting;

Fig. 3 is a flow chart for describing the operation of the embodiment of the present invention in waiting time; and

Fig. 4 is a view showing a display example in the
25 embodiment of the present invention during movement.

PREFERRED EMBODIMENTS OF THE INVENTION

Preferred embodiments of the present invention will now be described with reference to the drawings.

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An embodiment of the present invention will now be described with reference to the drawings. Fig. 1 is a block diagram showing a W-CDMA terminal system as one embodiment of the present invention. Referring to the

5 Figure, the W-CDMA terminal 1 comprises an antenna 10, a radio unit 11, a control unit 12, a storing unit 13, an operating unit 14, a display 15, a loudspeaker 16, a vibrator 17, and an LED (Light-Emitting Diode) 18.

The radio unit 11 executes transmission and

10 reception of signals to and from a plurality of base stations (not shown). A control unit 12 has roles of controlling the radio unit 11 and management of radio signal protocol, and stores the input data from the radio unit 11 and the operating unit 14 in the storing unit

15 13. The control unit 12 controls the radio unit 11 on the basis of the data stored in the storing unit 8 in response to requests from the operating unit 14.

The operation unit 14 causes display of the status of the own terminal system on the display unit 15 on the

20 basis of the signal from the control unit 12. The loudspeaker 16, the vibrator 17 and the LED 18 are controlled by commands of the control unit 12.

Fig. 2 is a flow chart for describing the operation of an embodiment of the present invention in presence

25 position store setting and function setting. Fig. 3 is a flow chart for describing the operation of the embodiment of the present invention in waiting time. Fig. 4 is a view showing a display example in the embodiment

of the present invention during movement.

The operation of the W-CDMA terminal system 1 will now be described with reference to Figs. 1 to 4. The routines shown in Figs. 2 and 3 are realized through the control by the control unit 12 based on the programs stored in the storing unit 13. As memory 13 may be used, for instance, a writable/readable non-volatile memory.

In presence position store setting and function setting, according to operation in the operating unit 14 the control unit 12 causes broadcast data of base stations being received by the radio unit 11 and the reception levels of these data to be stored in the storing unit 13. As data to be stored in the storing unit 13, such names as office and own home are set. In this case, a function of setting various functions for each preset presence position is provided.

In the presence position store setting, when a "setting display call" is designated by a key operation in the operating unit 14, the control unit 12 causes the operating unit 14 to display a question "STORE SETTING: YES/NO" for the setting on the display unit 15 (step S1 in Fig. 2).

When "STORE SETTING: YES" is selected by a key operation in the operating unit 14, the control unit 12 stores the broadcast data from the base station being received by the radio unit 1 and the reception levels of these data as presence position data in the storing unit 13 (steps S2 and S3 in Fig. 2). At this time, the

control unit 12 causes the operating unit 14 to display a message "PRESENCE POSITION DATA HAS BEEN STORED." on the display 15.

Subsequently, the control unit 12 causes the
5 operating unit 14 to display "NAME SETTING" on the display 15, and causes a name (such as office, own home, etc.) preset by a key operation in the operating unit 14 to be added to the presence position data (step S4 in Fig. 2).

10 Thereafter, the control unit 12 causes a display of "FUNCTION SETTING" by a key operation in the operating unit 14, and causes the registered functions corresponding to individual stored presence position data to be stored in the storing unit 13 (steps S2 and
15 S3 in Fig. 2). Among function setting items are call arrival tone, call arrival tone level, out-of-home dealing function ON/OFF and call transfer function ON/OFF.

When these function setting items are registered,
20 the radio unit 11 in the W-CDMA terminal system notifies, in the waiting time, the number of received branches, reception levels thereof and received broadcast data to the control unit 12.

In its waiting operation, the control unit 12
25 monitors the broadcast data received by the radio unit 11 and the reception levels at all times (step S11 in Fig. 3). The control unit 12 compares the received data from the radio unit 11 and registered data read out from

the storing unit 13 (step S12 in Fig. 13), and checks whether the received data and the registered data are coincident, that is, whether the own terminal system is in a registered presence position (step S13).

5 When the received data and the registered data are coincident, the control unit 11 causes the operating unit 14 to display a message of a content that the presence position is recognized on the screen of the display unit 15, or it causes an alarm sound to be produced from the
10 loudspeaker 16, thus notifying the recognition of the presence position to the user (step S14 in Fig. 3). Subsequently, the control unit 12 executes setting of various functions, such as call arrival tone, call arrival tone level and out-of-home dealing ON/OFF (step
15 S15 in Fig. 3).

 When the received data and the registered data fail to be coincident, the received data is changed to the registered data preset in the storing unit 13 (step 17 in Fig. 3), whereupon the control unit 12 switches again
20 the functions having been preset to those of default setting (step S18).

 By the above operation the terminal system sets various functions by recognizing its own presence position. When the terminal system is not present in any
25 registered place, "DATE" and "TIME: 00:00" are displayed. When the terminal system is brought to a registered presence position (such as office or own home", the registered presence position "OFFICE" or "OWN HOME", is

displayed together with "DATE" and "TIME: 00:00" (see Fig. 4).

As shown above, the terminal system can recognize its own presence position by monitoring received data constituted by broadcast data from a plurality of base stations and reception levels of these data and comparing the received data with registered data in the storing unit 13. The terminal system thus can set by itself the functions corresponding to its presence position (i.e., registered presence position). For instance, when the user is in the office, the terminal system sets the call arrival tone to be "OFF" or "VIBRATION", and it is thus possible for the user to prevent, when he or she returns home, to prevent failure of being informed of a call arrival by leaving the call arrival tone "OFF".

Since the terminal system is adapted to recognize its own presence position, it can also recognize by itself a non-registered presence position when it is in such a place. Thus, when the terminal system is being moved by a train or a car, in which the number of base stations being received and the reception levels undergo frequent changes, it can automatically change mode to high speed travel mode and cancel call arrivals by itself. Also, at the time of release of high speed travel, the terminal system can automatically restore the normal condition.

As has been described in the foregoing, according to the present invention a radio communication terminal system, which executes a waiting operation by receiving

broadcast data from a plurality of base stations, it can make recognition by itself as to whether it is in a registered presence position by storing the broadcast data from a plurality of base stations and reception
5 levels of these data at preset registered presence positions as registered data and comparing, when it is waiting, the broadcast data of a plurality of base stations being received and the reception levels of these data with registered data.

10 Also, a different radio communication terminal system according to the present invention can set by itself, when it detects coincidence of the compared data, functions corresponding to the registered presence position where it is in by setting its functions with
15 preset contents of function setting items corresponding to pertinent registered data.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the
20 scope of the present invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. It is therefore intended that the foregoing description be regarded as illustrative rather than limiting.

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